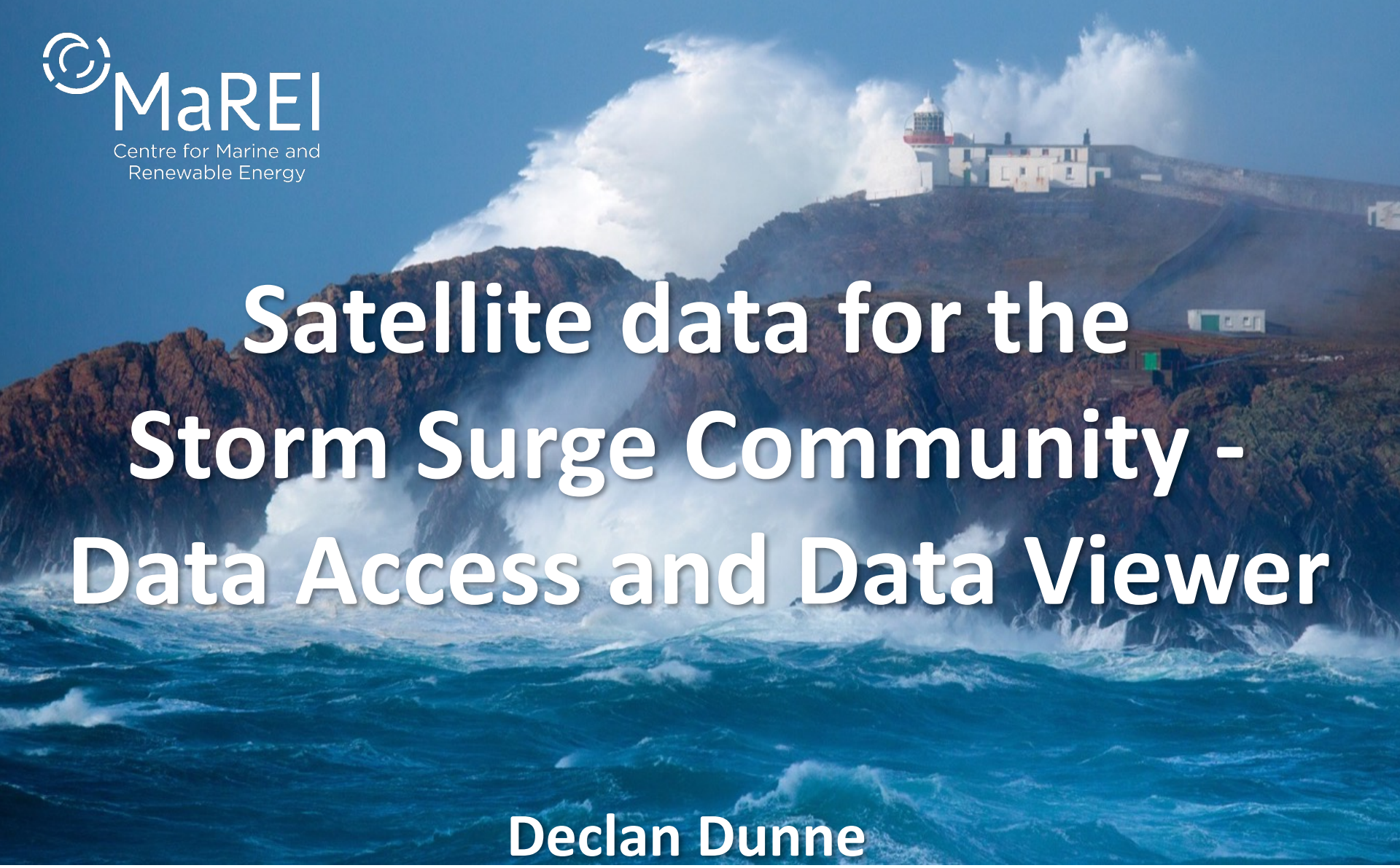

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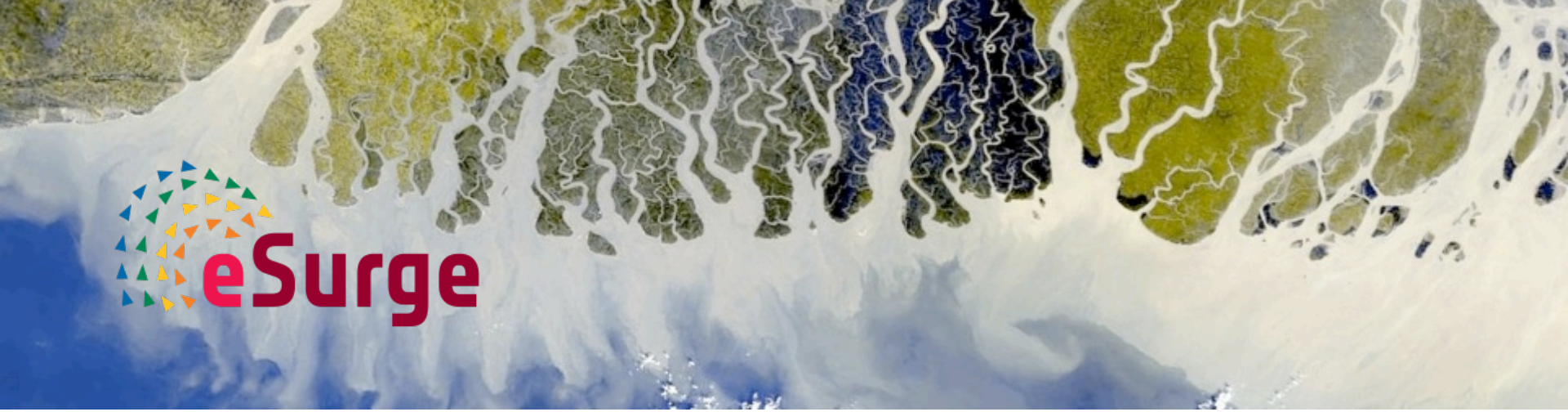
Satellite data for the Storm Surge Community - Data Access and Data Viewer

Declan Dunne



ESA's DUE eSurge Project: Improving storm surge modelling with advanced satellite data products.

Phillip Harwood, CGI

Paolo Cipollini, Helen Snaith, NOC

Jacob Høyer, Weiwei Fu, Kristine Madsen, DMI

Rory Scarrott, Declan Dunne, MaREI

Ad Stoffelen, Tilly Driesenaar, KNMI

Craig Donlon, ESA

esa

CGI

National Oceanography Centre
NATURAL ENVIRONMENT RESEARCH COUNCIL

DMI

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Koninklijk Nederlands Meteorologisch Instituut
Ministerie van Infrastructuur en Milieu

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ERI
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UNIVERSITY COLLEGE CORK

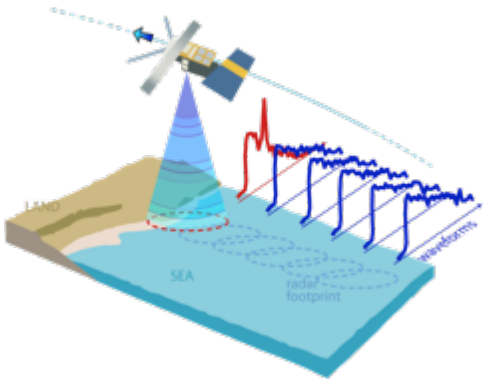
UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

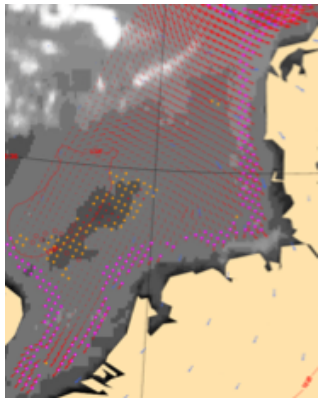
- **eSurge is the ESA Storm Surge Demonstration Project, funded through the Data User Element (DUE) programme.**
- **Its mission is:**

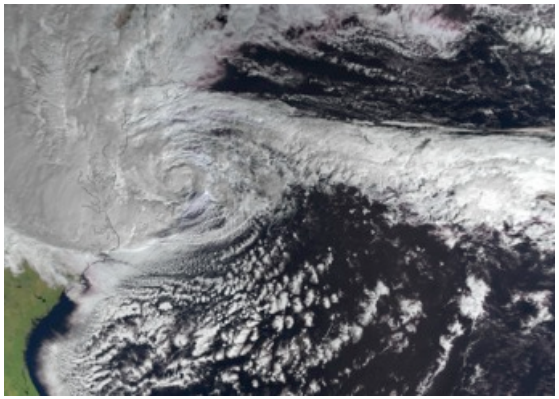
  To support storm surge systems, their services, engineers and scientists by facilitating the widespread user uptake and application of advanced information products from ESA and other Earth Observation missions.
- **Make relevant data freely available throughweb portal**

  www.storm-surge.info
- **Provide new types of data, especially coastal altimetry.**

- Satellite data already play a critical role in storm forecasting.
- However the modeling and forecasting of surges could be improved by use of newer types of satellite products.
  - Coastal altimetry
  - High resolution and near-coast winds from scatterometry
- These can be used:
  - For validating model results after an event
  - As inputs to NRT models during an event.







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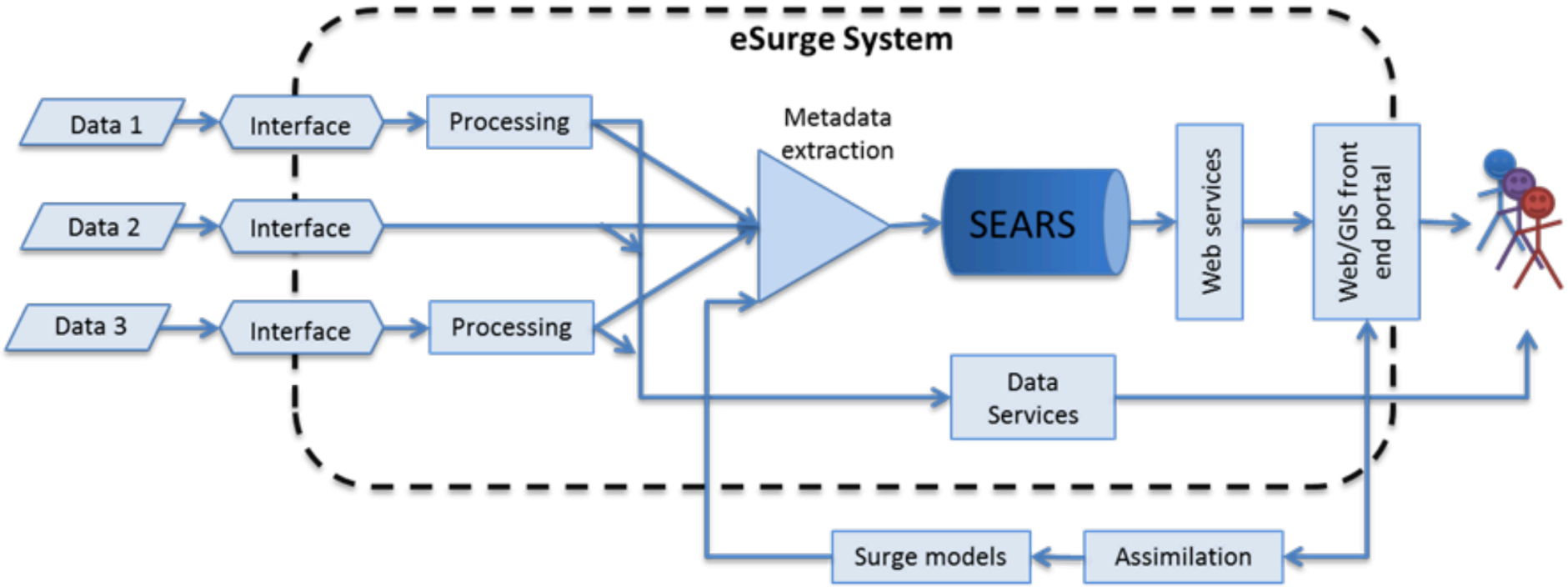
SEARS (Surge Event Analysis and Repository Service) database and file store



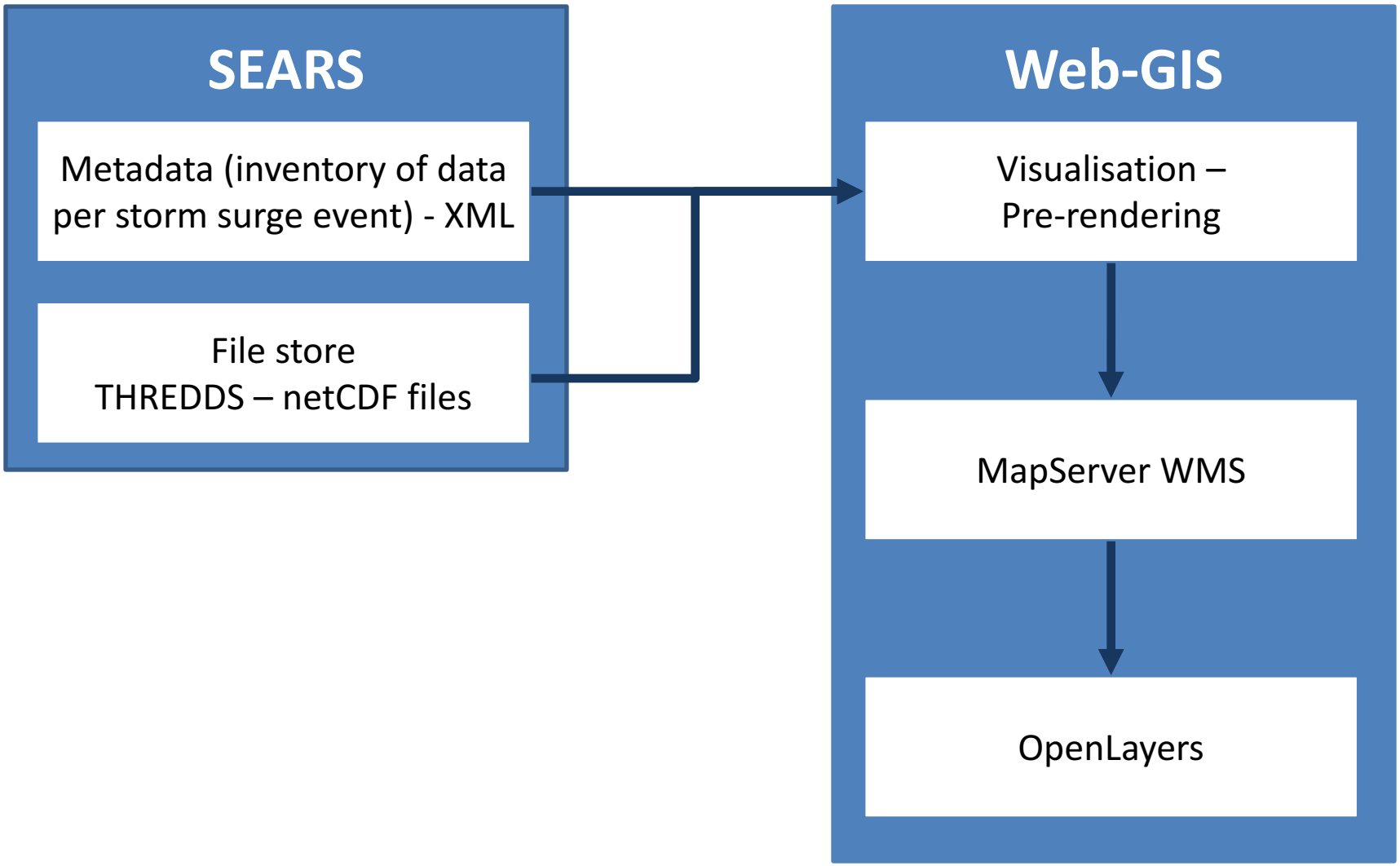
Provides core functionalities to allow the data to be integrated, catalogued, searched and accessed

- **SEARS developed by NOC**
- **Web-GIS developed by MaREI, UCC**

eSurge data type	Parameter (visualised in portal)
• Bathymetry • Digital Elevation Model	Surface topography
• Flood maps	Inundation (1=inundation, 0=no inundation)
• Infrared Meteosat6 • Infrared Meteosat7	Infrared
• Tropical Cyclone Heat Potential	Tropical Cyclone Heat Potential (kJ cm-2)
• Ocean Colour (MERIS)	chlorophyll 1 content
• Sediment Concentration (MERIS)	total suspended matter
• Sea Surface Temperature (Multi-satellite)	analysed sea surface temperature
• Tide gauges (DMI)	sea surface height above sea level
• Surge Hindcast Products: DMI-North Sea and Baltic	sea level (model)
• Wave Model reanalysis - DMI	significant wave height (model)

eSurge data type	Parameter (visualised in portal)
Scatterometer Winds • ASCAT L2 12.5km coastal (KNMI) • ASCAT L2 25km (KNM) • ASCAT-B L2 12.5km coastal (KNMI) • ASCAT-B L2 25km (KNMI) • OSCAT L2 25km (KNMI) – experimental • OSCAT L2 50km (KNMI) • QuikSCAT L2 25km (KNMI) • QuikSCAT L2 100km (KNMI)	Wind speed and direction at 10 m
• ASCAT L3 12.5km coastal (KNMI)	Wind speed and direction at 10 m

eSurge data type	Parameter (visualised in portal)
Open Ocean Altimetry • Envisat • ERS1 • ERS2 • GFO • Jason1 • Jason2 • NRT Jason2 • TOPEX/Poseidon	Ku band calibrated significant waveheight (swh_calibrated)
Open Ocean Altimetry • Cryosat2 • NRT Cryosat2	Ku band corrected significant waveheight (swh)
• Coastal altimetry – Envisat	Total water level envelope (twle)
• NRT Coastal altimetry - Cryosat2	Total water level envelope (hi_h_twle_samosa3)
• SAR wave spectra	Calibrated total significant wave height of imaged waves (swh_calibrated)


SEARS
Metadata (inventory of data per storm surge event) - XML
File store
THREDDS – netCDF files
Web-GIS
Visualisation – Pre-rendering
MapServer WMS
OpenLayers

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Example visualisaion processing (automated via a Python script)

- Download netCDF (e.g. point cloud)
- Generate CSV file from netCDF variable
- Grid CSV (GDAL or GMT) – GeoTIFF raster
- Build colour ramp and legend image
- Apply colour ramp to GeoTIFF (GDAL)
- Reproject to EPSG:3857 (GDAL)
- Build SQLite database for time-series support
- Build MapServer WMS Mapfile

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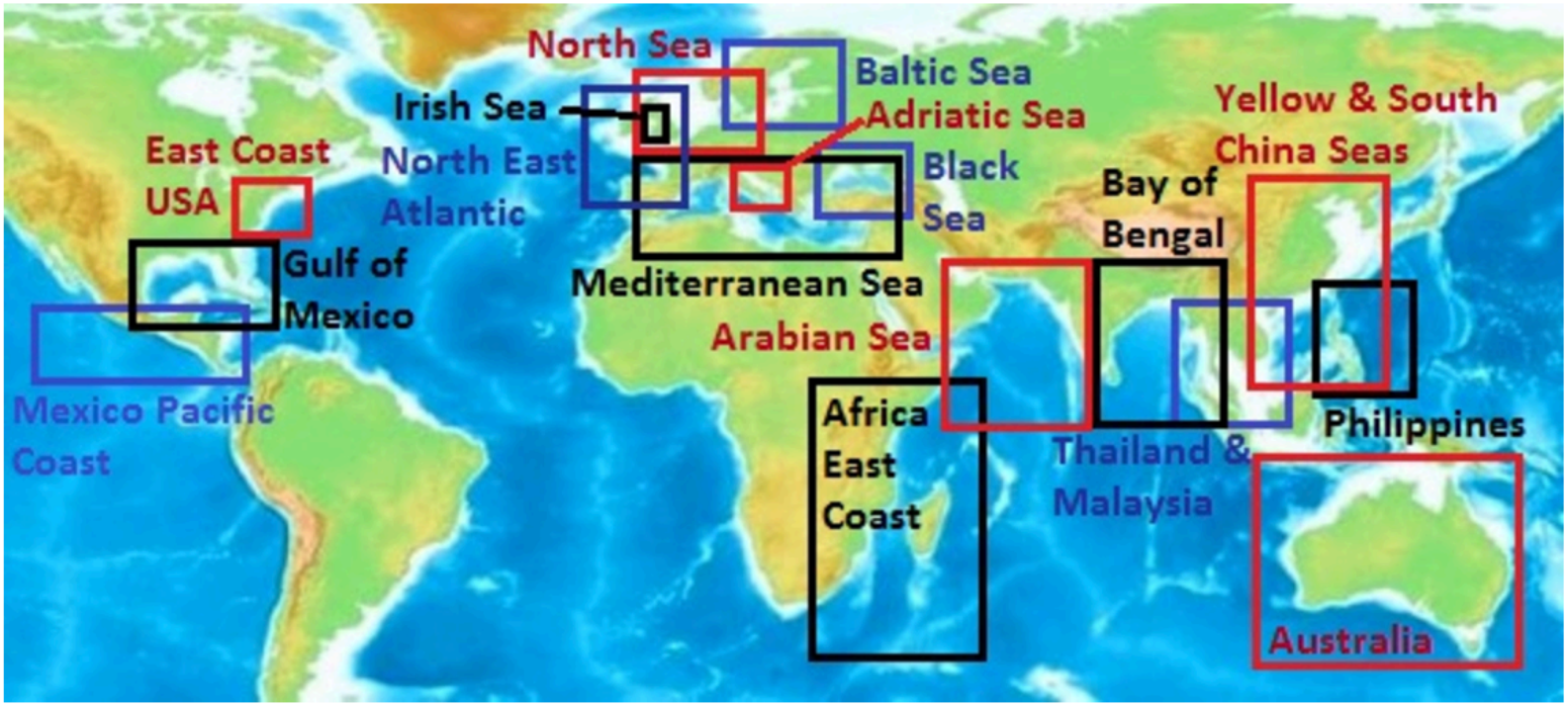
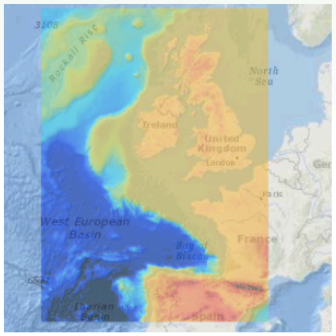
Storm surge data broken into Areas of Interest



Example Area of Interest: North East Atlantic

NE Atlantic Ocean.



This is the list of storm surge events in AOI_020 (NE Atlantic Ocean) for which data are available in the eSurge database.

If you are interested in an event which does not appear in this list, please contact us to see it can be added.

Surge event	Nominal event date	Earliest data available	Latest data available
Storm Doris	2 Feb 2017	29 Jan 2017	5 Feb 2017
SEV initiated in response to NW Spain storm warnings	1 Feb 2017	28 Jan 2017	4 Feb 2017
Storm Angus (Storm "Nannette")	20 Nov 2016	16 Nov 2016	23 Nov 2016
Coastal flooding reported in Cork, Ireland	10 Apr 2016	6 Apr 2016	13 Apr 2016
Storm Jonas	26 Jan 2016	22 Jan 2016	29 Jan 2016
Storm Abigail	12 Nov 2015	8 Nov 2015	15 Nov 2015

List of data products available for a storm surge event

Storm Doris (2017-02-02)

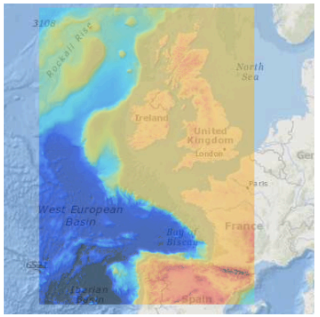
SEV ID: eS_SEV20170202/AOI_020.

Surge event dated 2017-02-02 in AOI_020 (NE Atlantic Ocean). More information on this event.

The available data types for this event are listed below. Click on the ⌄⌄ symbol to see the individual data sets available, and to preview and download them.

Alternatively, use the eSurge viewer to overlay and compare data sets.

In case of problems, please consult the help page.

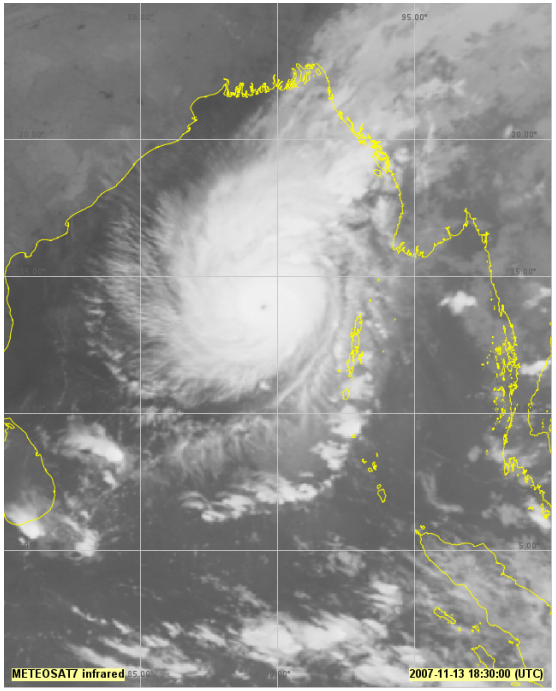


Available data:

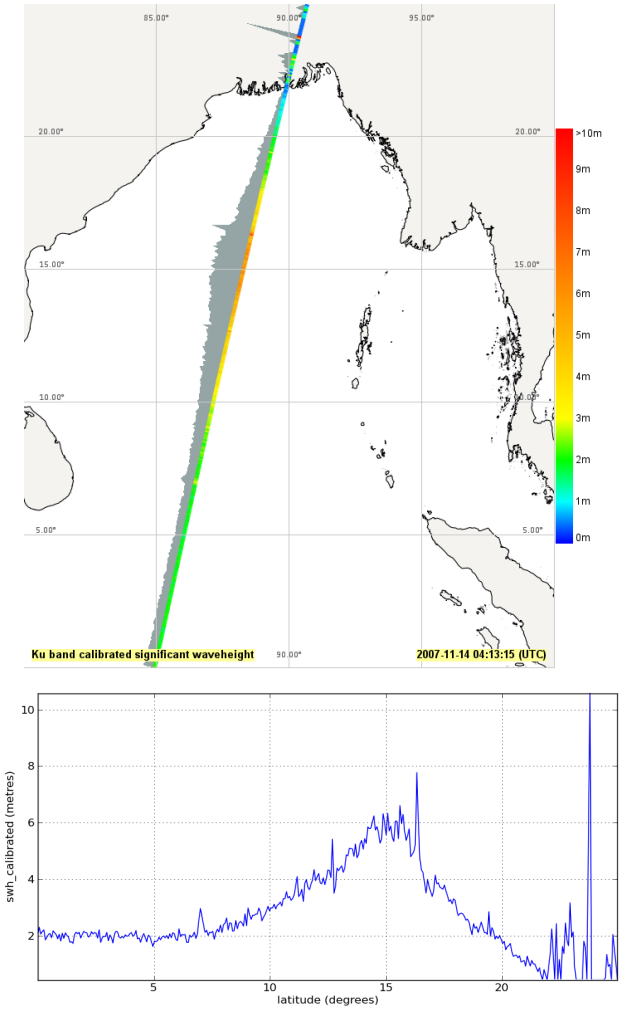
Conditions of use.

Bathymetry	Handbook | Product Info	⌄⌄
Digital Elevation Model	Handbook | Product Info	⌄⌄
NRT Wave Products: Open Ocean Altimetry-Jason2	Handbook | Product Info	⌄⌄
Scatterometer Winds ASCAT L2 12.5km coastal (KNMI)	Handbook | Product Info	⌄⌄
Scatterometer Winds ASCAT Level 2 25km (KNMI)	Handbook | Product Info	⌄⌄
Scatterometer Winds ASCAT-B L2 12.5km coast (KNMI)	Handbook | Product Info	⌄⌄
Scatterometer Winds ASCAT-B Level 2 25km (KNMI)	Handbook | Product Info	⌄⌄
Sea Surface Temperature (Multi-satellite)	Handbook | Product Info	⌄⌄
Wave Products: Open Ocean Altimetry-Cryosat2	Handbook | Product Info	⌄⌄

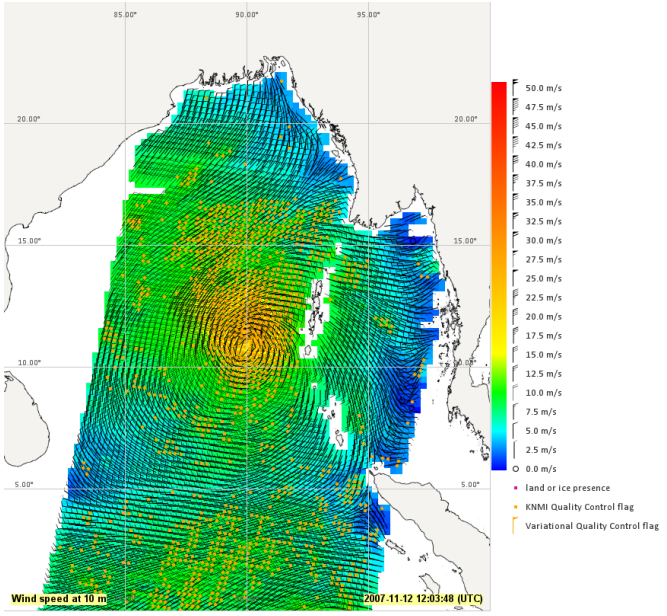
Example data previews



Meteosat7 Infrared



Wave Products: Open Ocean Altimetry-Envisat



Scatterometer Winds QuikSCAT 25km (KNMI)

Cyclone Sidr event, Bay of Bengal, 15 Nov 2007

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Thanks!

Declan Dunne

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